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## The neural basis of voluntary movement initiation

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To execute a voluntary movement, your brain must choose both which movement to make and when to make it. Sometimes these choices are made almost simultaneously, while on other occasions you may prepare an action but delay execution until the right moment. In either case, the signals regarding ‘what’ to do and ‘when’ to do it need to be conveyed to the motor structures that will send the final outgoing command to the spinal cord. These structures include the primary motor cortex, premotor cortex, and a variety of brainstem nuclei. An extensive corpus has established that neural activity in these areas is ‘tuned’: it reflects which movement will be made. Fewer studies have focused on potential signals related to when movement is triggered. We report that a putative ‘trigger signal’ is not only present in the motor cortices, but dominates the cortical response. That is, the largest response component in motor and premotor cortex reflects not which movement will be made, but when movement will be initiated. This movement-independent response component predicts the exact moment of movement onset with remarkable precision. We speculate that the movement-independent response reflects the arrival of an incoming trigger signal that directly recruits the neural dynamics that generate movement. This speculation is supported by recent modeling work indicating that a movement-independent signal is a natural candidate to ‘turn on’ the dynamics of movement generation.